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August 19, 2013

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Ms. Kris McCaig
Teck America Incorporated
501 N Riverpoint Blvd., Suite 300
PO Box 3087
Spokane, Washington 99220-3087

RE: Expected Level of Effort For Sampling Benthic Macroinvertebrate Tissue, Upper Columbia River Project

Dear Ms. McCaig:

Attached is the Expected Level of Effort for Macroinvertebrate sampling for the Upper Columbia River Project. EPA is anticipating that Teck American Inc will submit this document by the end of January 2014.

If there are any concerns regarding the LOE please contact me at 208/378-5760.

Sincerely,

A handwritten signature in cursive script that reads "R. Matthew Wilkening".

R. Matthew Wilkening
Upper Columbia River Project Manager

Enclosure

cc: Dan Audet, U.S. Dept. of Interior
Patti Bailey, Confederated Tribes of the Colville Reservation
Randy Connolly, Spokane Tribe of Indians
John Roland, WA Dept. of Ecology
Laura Buelow, EPA-Hanford Office, email only
Dennis Faulk, EPA-Hanford Office, email only



Expected Level of Effort for Sampling and Analysis of Benthic Macroinvertebrate Tissue - Upper Columbia River Site

Date: July 16, 2013 (version 1.1)

Developed by: Laura Buelow/USEPA, Julie Campbell/USFWS, Brendan Dowling/WA Ecology, Whitney Fraser/EI, Cameron Irvine/CH2M HILL, Tamara Knudson /STI, Burt Shephard/USEPA, Matt Wilkening/USEPA

1. Purpose

This level of effort (LOE) technical memorandum (TM) outlines the work Teck American Inc. (TAI) is expected to undertake to delineate and characterize the levels of the chemicals of interest (COIs) in tissues of mussels and crayfish sampled from the Upper Columbia River (UCR) Site. The LOE is the first step in a process that culminates in approval of a quality assurance project plan (QAPP) for collection and analysis of samples at the UCR Site. The data generated as a result of implementing the benthic invertebrate tissue QAPP must be of suitable quality for the assessment of risks to human and ecological receptors that may consume benthic invertebrates within the UCR Site.

For the purposes of this LOE TM, benthic macroinvertebrate will be represented by mussels and crayfish. Within the UCR, mussels and crayfish are an important food source for numerous fish (including white sturgeon), some aquatic-dependent wildlife species, and humans. Ecological and human receptors consuming mussels and crayfish could be exposed to, and be placed at risk by, contaminants of interest (COIs) that have accumulated in the tissues of these macroinvertebrates. At present, the lack of high quality tissue data representative of current UCR conditions is a significant data gap for both the human health and ecological risk assessment processes. EPA specifically expects the Baseline Ecological Risk Assessment (BERA) for the UCR site to consider mussel and crayfish tissue concentration data in aquatic-dependent wildlife exposures modeling. Mussel and crayfish tissue concentration data will also be used in the Human Health Risk Assessment (HHRA).

2. Required LOE

EPA's anticipated minimum level of effort for the sampling and analysis of mussels and crayfish is described below.

2.1 Sample Locations, Number, and Timing

Mussels and crayfish have been found in the tributaries, reservoir, and the main stem of the UCR and consumption survey data for the Colville Confederated Tribes (CCT) show that freshwater mussels and crayfish are consumed by local residents (Westat 2012). These organisms are also consumed by aquatic-dependent wildlife. The QAPP must specify, and provide a rationale for, the number of sampling sites and their locations within areas of the UCR affected by contamination and in background (or reference) areas.

Statistically-based sampling may be used to obtain coverage throughout the UCR, but sampling must also occur in areas of known sediment contamination, from areas known to be used by UCR residents (e.g., Westat 2012), and in areas where known target species are located (USFWS 2012; Exhibit 1; Attachment A). Sampling locations may include those referenced in the Tribal Consumption and

41 Resource Use Survey (Westat, 2012) (e.g, Rebecca Lake, Buffalo Lake, the mouth of the Sanpoil River),
 42 and the Swawilla Basin (western Lake Roosevelt). The total number of sampling locations must be
 43 sufficient to meet the data needs of the risk assessments.

44 If seasonal affects on species presence or activity is a consideration, the QAPP must specify when
 45 samples should be collected. For example, sampling prior to crayfish spawning (June-July) would result
 46 in more conservative tissue concentrations while post-spawn sampling would be less conservative due
 47 to maternal transfer of contaminants causing a reduction in female mussels and crayfish body burdens.

48 The QAPP should propose an approach for deriving site-specific background concentrations for COIs in
 49 representative benthic macroinvertebrates. Possible locations for background samples should consider
 50 tributaries not affected by mining sources and may include locations upstream of Trail. Reconnaissance
 51 may be necessary to confirm the presence and abundance of comparable species at potential reference
 52 locations. Also consider that background locations may need to differ for crayfish and mussels due to
 53 the more mobile nature of crayfish (i.e., relatively larger home range) that could travel between
 54 tributaries and exposed areas.

55 **Exhibit 1. Target Mussels and Crayfish Occurrence in the UCR.**

Species	Locations Mussels and Crayfish are Known to Occur
Crayfish	Plentiful from Spring Canyon to the Sanpoil River Orapaken and Alder Creeks (North of Hunters) North Columbia Campground (confluence with the UCR approximately 5 miles north of the Spokane R. confluence; east side) Castle Rock Creek (confluence with the UCR approximately 3 miles north of the Spokane R. confluence; east side)
<i>Orconectes virilis</i> (Northern/virile crayfish)	Upper Columbia River (dominant species)
<i>Pacifastacus leniusculus</i> (Signal crayfish; native; not abundant)	Keller Ferry, Not abundant/Not in main stem UCR; Kettle River and Spokane River
Mussels	Kettle River and tributaries Cayuse Cove – mussel bed downstream of Porcupine Bay
<i>Anodonta</i> clade 2 (Oregon/western floater)	
<i>Anodonta</i> Clade 1 (winged/California floater)	Hayes Island (highest densities of all mussels)
<i>Anodonta beringiana</i> (Yukon floater; historic populations)	
<i>Margaritifera falcata</i> (western pearlshell; historic; not found in recent USFWS surveys)	Little Jim Creek, North Gorge, China Bar, Deadman's Eddy , Kettle River
<i>Gonidea angulata</i> (Western ridged mussel)	
Invasive clams (e.g., <i>Corbicula fluminea</i>)	Keller Ferry

56

57 2.2 Sample Types, Number, and Size

58 The QAPP must specify and provide a rationale for the type (e.g., species, size), number, and size (i.e.,
59 mass) of samples to be collected at each sample location. Sampled individuals should be identified to
60 genus or species. Mussel identification methods should be based on *Freshwater Mussels of the Pacific*
61 *Northwest* (Neddeau *et al.* 2009) with a caution that shell morphology may not be reliable to determine
62 species, but may be reliable for clades (particularly for *Anodonta* sp.).

63 The sample volume needed to support chemical analyses must be described. It may be difficult to
64 collect sufficient tissue mass from an individual organism to meet analytical chemistry requirements;
65 therefore, the volume required may need to be achieved by composite sampling at any given location.
66 If composite sampling is anticipated (e.g., separate samples for different species, compositing among
67 taxa, or compositing within taxa), the QAPP should specify a compositing scheme deemed optimal for
68 estimating exposure point concentrations for use in both human and ecological risk assessments.

69 This discussion should consider the approach and rationale for collecting and comparing samples from
70 exposed and reference locations that may consist of different species. For example, northern crayfish
71 dominate the crayfish community in the UCR whereas the native signal crayfish have been rarely
72 encountered in the UCR and are present in the Kettle River. The Kettle River may not be an appropriate
73 background sampling location for crayfish as natives may have different uptake rates/tissue
74 concentrations than non-natives. TAI will report the location and consult with EPA if signal crayfish are
75 encountered in the reservoir or riverine segments of the UCR. Likewise, the western pearlshell mussel is
76 found in the Kettle River but has not been found in recent years in the mainstem UCR. If found, these
77 would be preferentially collected for consumption by UCR residents. TAI will report the location and
78 consult with EPA if western pearlshell mussels are found in the reservoir or riverine segments of the
79 UCR. Also note that invasive clams (e.g., *Corbicula* sp.) are not target species and should be sampled
80 separately from mussels, if encountered. A plan for handling and processing any incidental capture of
81 non-target species, consistent with collection permit requirements, should also be described in the
82 QAPP.

83 The QAPP should discuss whether any specific ages, size classes, or stages of species are required or
84 preferred. For example, soft-shelled crayfish could be sampled separately from hard-shelled crayfish. A
85 description and rationale for handling and processing these samples should be described. Northern
86 crayfish may be abundant enough to determine concentration differences between soft and hard-
87 shelled samples. Any observed abnormalities will be documented (i.e., photo and description in notes).

88 Viscera-only samples are acceptable for mussels. Whole-body samples should be collected for crayfish
89 (which can be consumed whole by both humans and wildlife). Additional samples of just the tail/claws
90 and just the head/viscera should also be considered for human consumers to evaluate exposures for
91 those who selectively consume these parts (Westat 2012). Individuals should not be depurated prior to
92 analysis.

93 2.3 SOP for Sample Collection

94 The QAPP should include an appendix detailing the standard operating procedures (SOPs) for the
95 collection and handling of benthic macroinvertebrate tissue samples, including quality assurance (QA)
96 samples, up to the point they are shipped to the laboratory for analysis.

97 Many different styles of traps are available for collecting crayfish and method success can depend on
98 the habitat (USFWS pers. comm.). Traps with escape guards should be used, and bait placed in
99 cheesecloth or nylon bags that cannot be torn open by crayfish claws. Common baits used in traps

include canned cat food, hot dog pieces, and cut-up pieces of fish (which are reportedly quite successful). Fish oils can also be used on the bait bags. The USFWS deployed traps (and captured crayfish) in water-depths ranging from 2 to 60 feet (USFWS 2012), so variable sampling depths can be achieved and should be considered in the QAPP. Trapping areas should also be selected based on suitable crayfish habitat. The use and bias associated with various mussel sampling methods (e.g., Ponar dredges, brail bars, benthic dredges) are described by Strayer and Smith (2003).

2.4 Analyses

The Remedial Investigation/Feasibility Study (RI/FS) work plan (USEPA, 2008) defined the initial COIs for the RI/FS. The 2010 screening-level ecological risk assessment (SLERA) (TAI 2009) identified COIs that could be eliminated from further consideration within broad media categories, as well as chemicals of potential concern (COPCs) that required further evaluation. Based on the SLERA, a wide variety of chemicals may be of concern in the UCR. These include metals and metalloids, semi-volatile organic compounds including PAHs, pesticides, polychlorinated biphenyls (PCBs), polybrominated diphenylethers (PBDEs), and polychlorinated dibenzodioxins and dibenzofurans (TCDDs/ TCDFs). Due to the conservative nature of the assumptions used in the SLERA, it is possible that some COPCs that actually do not pose a risk were screened through to the baseline ecological risk assessment (BERA). However, analyses should be described in the benthic invertebrate tissue QAPP for all COPCs that may pose a risk to receptors that consume benthic invertebrates.

When selecting target analytes for benthic macroinvertebrate tissue analyses, the QAPP will discuss whether analytes can be prioritized based on the available sample mass. At a minimum, all samples will be analyzed for metals, speciated arsenic, inorganic and methyl mercury, percent lipids and percent moisture.

At the laboratory, samples will be processed and analyzed for the selected target analytes using EPA approved analytical methods and appropriate QA/QC procedures, including analyses of invertebrate tissue standard reference materials. Analytical methods, including sample extraction methods, and performance criteria (e.g., MDLs and MRLs) will be described in the QAPP. Tissue samples will also be analyzed for percent lipids and percent moisture. The QAPP should include (as appendices) SOPs that will be used by the selected laboratory for the preparation and extraction of biota tissue samples, as well as procedures for the calculation of percent lipids.

3.0 References

- Neddeau, E.J., A.K. Smith, J. Stone, and S. Jepsen. 2009. Freshwater Mussels of the Pacific Northwest. Second Edition. http://www.xerces.org/wp-content/uploads/2009/06/pnw_mussel_guide_2nd_edition.pdf
- Strayer, D.L. and D.R. Smith. 2003. A guide to sampling freshwater mussel populations. American Fisheries Society, Monograph 8. Bethesda, Maryland.
- Teck American Incorporated (TAI). 2009. Screening Level Ecological Risk Assessment. Prepared by Parametrix, Integral, and Exponent.
- U.S. Environmental Protection Agency (USEPA). 2006. Phase 1 Sediment Sampling Data Evaluation — Upper Columbia River Site CERCLA RI/FS. Draft. Prepared by CH2M HILL and Ecology and Environment.
- U.S. Environmental Protection Agency (USEPA). 2008. Remedial Investigation/Feasibility Study Work Plan — Upper Columbia River Site. Prepared by CH2M HILL.

- 141 United States Fish and Wildlife Service (USFWS). 2012. Unpublished crayfish survey data and 2012-13
142 unpublished mussel survey data.
- 143 United States Fish and Wildlife Service (USFWS). 2013. Personal communication from Julie Campbell to
144 USEPA. May 21, 2013.
- 145 Westat. 2012. Upper Columbia River Site Remedial Investigation and Feasibility Study Tribal
146 Consumption and Resource Use Survey. Final Report. Prepared for the USEPA, Region 10. June 22, 2012.

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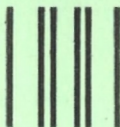
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